Comparison of macroalgal dominants in the two Olentangy River experimental wetland basins

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Introduction

Monitoring over the past four years in the two created wetlands provides evidence of ongoing shifts in the populations of the macroalgal dominants. While both plankton and algal mat samples have been monitored, the mat (or "clump" samples) are consistently the most productive in terms of number and frequency of all forms of algae. Annually, the most visible changes in the macroalgae of the wetlands are fluctuations in the populations of *Hydrodictyon*, *Cladophora*, *Rhizoclonium* and *Spirogyra*. These fluctuations take place month-to-month and in different parts (inlet, mid-basin, and outlet) of each wetland.

Although several genera appear either consistently but at low population levels, or sporadically at higher density levels, the four genera (above) appear to be the major competitors and the most important in providing suitable habitat for the numerous genera of microalgae that have been identified.

Methods

Collections were taken by a systematic sampling of floating mat and plankton tows in the inlet, mid-basin and outlet areas of each wetland. Mat samples were a collection of different "clumps" within each basin area. Plankton samples were the compilation of three tows within each basin area. The number of months sampled have varied, from as few as four to as many as eight in a year.

Each sample was surveyed by preparing three slides. Mat samples were prepared using forceps to collect filaments that appeared to be different in color and texture in order to identify as many different genera as possible. Plankton samples were swirled and each sample was taken from the vortex. The sample under each 22 mm^2 coverslip was systematically surveyed at 100x magnification in a back-and-forth pattern; greater magnification was used as needed for specific identification. As a genus was identified, it was recorded on a spreadsheet.

Results and discussion

One of the primary goals of all wetland research at the Olentangy Research Park is to establish physical and biological trends of the experimental wetlands (Mitsch et al., 1998). Our specific goal of the algal survey is to identify as many of the algae in the sample as possible. The following data are based on whether a genus was identified in a given sample from one of the following six sample areas: Wetland 1-inlet, mid-basin, outlet and Wetland 2-inlet, mid-basin, outlet. Present/absent criteria were used to establish the annual frequency percentages (Fig. 1) and the

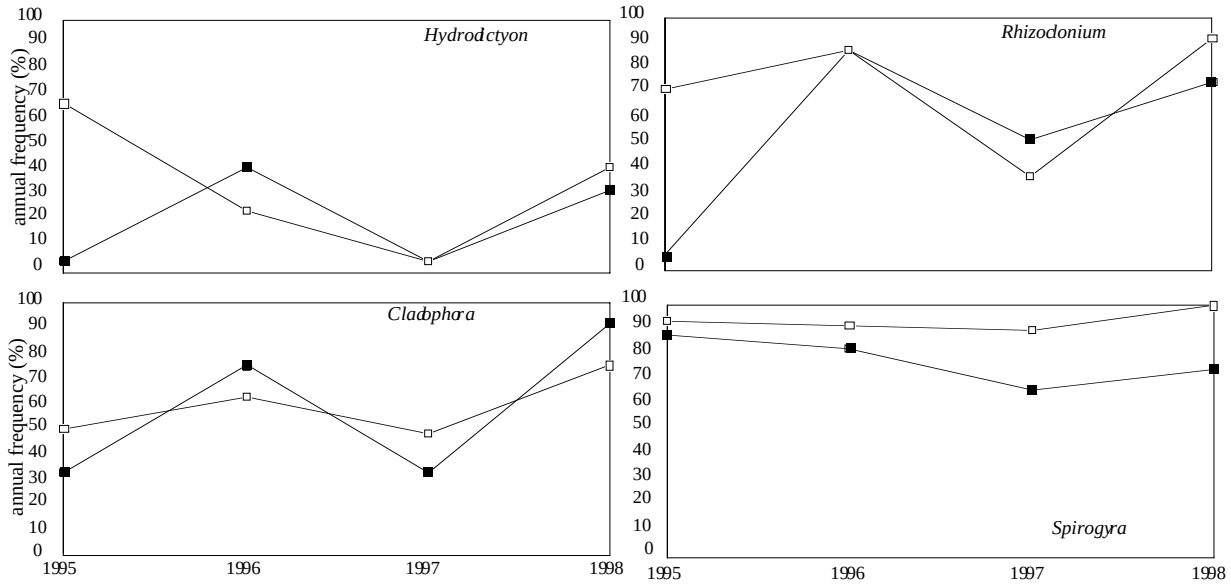

Figure 1. Annual frequency of macroalgal dominants in Wetland 1 (black squares) and 2 (open squares).

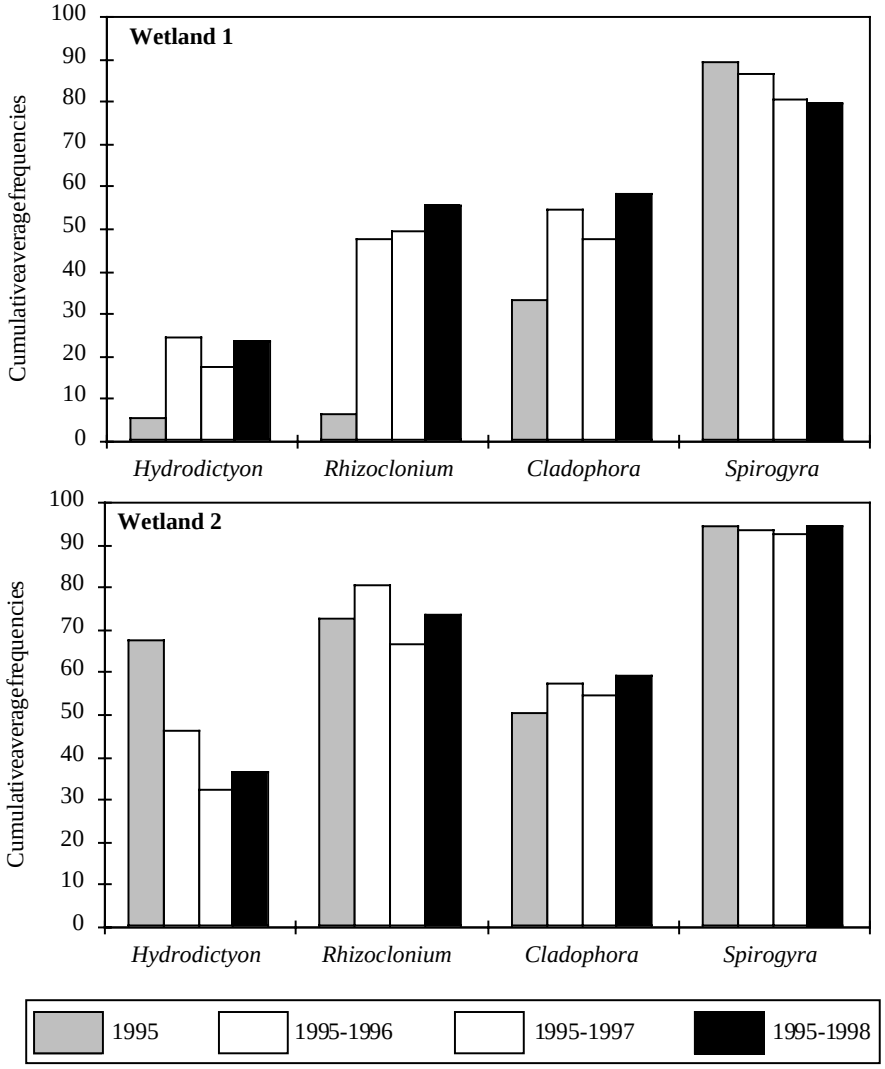

Figure 2. Four-year cumulative average frequencies in ORWRP Wetlands 1 and 2.

cumulative average frequency percentages (Fig. 2) for *Cladophor*a, *Hydrodictyon*, *Rhizoclonium*, and *Spirogyra*.

Specific data to note include that in 1995 all four genera had higher sampling frequency in Wetland 2 than in Wetland 1. Also, of the four genera (above), *Spirogyra* was the only one to appear in 90% or more of all samples from Wetland 2 each of the four years.

The shifts in sampling frequencies of *Rhizoclonium* and *Cladophora* over the four-year period provide an interesting comparison. While both genera exhibited higher sampling frequency in Wetland 2 than in Wetland 1 during 1995, their frequencies in both wetlands were quite similar in 1996 (Fig. 1). However, through 1997 and 1998, their sampling frequencies flip-flop as almost mirror opposites year-to-year. The data suggest that *Rhizoclonium* was more abundant in Wetland 1 during 1997, while *Cladophora* was more abundant in Wetland 2; in 1998 the opposite occurred. The shifting population dynamics of these two genera are especially interesting in light of the fact that they are closely related coenocytic algae.

While the annual frequency percentage data suggest shifting population densities of these genera between the two wetlands from year to year, the cumulative average frequency percentages (Fig. 2) suggest that all four genera have been more abundant in Wetland 2 than Wetland 1. This analysis suggests shifting and inconsistent population densities for three of the genera (*Cladophora*, *Hydrodictyon*, and *Rhizoclonium*); for *Spirogyra* it supports visual observations that this algae is becoming more abundant in Wetland 2 and less abundant in Wetland 1.

References

Mitsch, W.J., X. Wu, R.W. Nairn, P.E. Weihe, N. Wang, R. Deal, and C.E. Boucher. 1998. Creating and restoring wetlands. BioScience 48: 1019-1030.